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# H A N D B O O K

FOR THE

## 0.45-INCH GATLING GUN FOR NAVAL SERVICE.

1880.



LONDON :

*Printed under the Superintendence of Her Majesty's Stationery Office,*  
AND SOLD BY

W. CLOWES & SONS (Limited), 13, Charing Cross; HARRISON & SONS, 59, Pall Mall;  
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LONGMANS & Co., Paternoster Row; TRÜBNER & Co., 57 & 59, Ludgate Hill;  
STANFORD, Charing Cross; and C. KEGAN PAUL & Co., 1, Paternoster Square, E.C.;  
Also by GRIFFIN & Co., The Hard, Portsea;  
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ALEX. THOM & Co., Abbey Street, and E. PONSONBY, Grafton Street, Dublin.

1880.

*Price Sixpence.*

(1325. Wt. 2643.)





# 0·45-INCH GATLING GUN.

## DESCRIPTION.

Length	{ total	....	....	....	59·41 inches.
	{ of barrel	....	....	....	31·95 "
	{ of rifling	....	....	....	28·79 "
Preponderance	....	....	35 lb. at 15·375 inches from	....	centre of trunnions.
Calibre	....	....	....	....	0·45 inch.
Nominal weight, with drum (empty)	....	....	....	3	3 24.
Nature of rifling	....	....	....	....	" Henry."
Number of grooves	....	....	....	....	7
Twist of rifling	....	....	uniform, 1 turn in 22 inches.	....	....

The main features of the gun may be summed up as follows :—

1. It has 10 barrels and 10 corresponding locks. In working the gun the barrels and locks revolve together ; but irrespective of this motion the locks have a forward and backward motion of their own. The forward motion places the cartridges in the chambers of the barrels and closes the breech at the time of each discharge, while the backward motion extracts the empty cartridge cases after firing.

The gun is loaded and fired only when the barrels are in motion from left to right ; that is to say, while the handle or crank is being worked forward.

When the gun is in action there are always five cartridges going through the process of loading, and five cartridges in different stages of being extracted, and these several operations are continuous while the gun is being worked. Thus, as long as the gun is *fed* with cartridges the several operations of loading, firing, and extracting are carried on automatically, uniformly, and continuously.

2. The gun is fed by means of a *metal drum*, which fits on a pin in the centre of a *hopper* communicating with the cartridge carrier. The drum has 16 channels or columns, each of which can receive 15 cartridges. Thus each drum, when full, contains 240 cartridges. It weighs, empty, 22 lb., filled, 50 lb.

## SIGHTING.

The gun is provided with two sights, viz., one tangent scale (graduated in degrees and yards), and one fore sight.

## CARRIAGE.—(Wrought iron.) Mark I.

It is adapted for use as a travelling carriage, or for attachment to the gunwale of a ship, the upper portion, consisting of the elevating and traversing arrangement secured to a strong standard, being removable from the axletree, and fitting a socket in the gunwale.

The carriage consists of two bracket plates, 1-inch thick, having their upper ends flanged and riveted to the axletree, and their lower ends riveted to the trail eye. The plates are also connected by three distance bolts.

The axletree arms are 3rd class, and the distance between the shoulders is the same as in the carriage for 0·65-inch Gatling gun, but the centre of the

axletree is formed into a socket to receive the elevating arrangement. It is strengthened by being attached to the bracket plates by iron stays. The carriage has no trunnion bearings, but the gun rests on, and is attached to the plate or bed of the traversing motion which is combined with the elevating arrangement. This arrangement consists of a toothed arc and worm shaft, which is driven by a hand-wheel situated under the rear of the gun; it will give 25° elevation, and 30° depression.

The traversing motion consists of a plate or bed, pivoted at the front end to the elevating arrangement, the rear end being traversed by a worm shaft attached to its upper side, and a worm wheel with pinion working in a circular slot, and driven by a hand-wheel on the left side of the carriage. This arrangement will give 90° of lateral training, viz., 45° right and 45° left.

The wheels are 3 feet 6 inches diameter, with a track of 3 feet 6½ inches.

Weight of carriage complete, 4 cwt. 3 lb.

Tonnage of carriage and limber, for shipment, 1·545 tons; for transport in boats, 3·934 tons.

#### LIMBER.—(Wrought iron.)

The limber consists of an angle-iron frame, of which the sides or futchells are let into the upper side of the axletree bed. The front of this frame or splinter bar is of channel iron, as in field limbers. The frame is also strengthened by stay bolts which connect the splinter bar with the lower part of the axletree bed.

The axletree bed is formed of a gun-metal frame, to which two wrought iron plates are riveted. The upper part of the bed receives the limber frame, and to the lower part the axletree is firmly riveted.

The wheels are 3 feet 6 inches diameter, with a track of 3 feet 6½ inches.

A pole, with two slats and two prop sticks, is provided.

The limber carries one box arranged to contain six cartridge drums (1,440 rounds), and is fitted with two copper cases and two leather pockets to carry the spare parts detailed at p. 13.

Weight of limber, 4 cwt. 2 qrs. 8 lb.

#### CARRIAGE.—(Wrought iron.) Mark II and Limber.

Mark II carriage differs from Mark I in the following particulars, having chiefly for object increased stability to the swivel standard :—

1. The base of the swivel standard is enlarged to give a greater bearing surface on the top of the axletree bed.
2. The width of the standard is increased to form a wider guide for the elevating arc.
3. The elevating arc is fastened rigidly to the bed plate instead of being connected to it by loose pins.
4. The elevating spindle and bearing and all the working parts are more closely fitted to reduce the amount of play.
5. The worm wheel is enlarged on the base, so as to have a better bearing, and is fitted with a guide block to work in the groove of the bed plate.
6. The limber hook is increased in strength.

Weight, carriage complete, 4 cwt. 14 lb.; limber, 4 cwt. 2 qrs. 9 lb.

#### CARTRIDGE.

The cartridge is central fire, the case body being made of solid metal.

The bullet, consisting of an alloy of 12 parts lead and 1 part tin, weighs 480 grains.

The charge of powder is from 83 to 87 grains.

The total weight of one cartridge is about 787 grains, or 1·8 oz.

The bullet is inserted and secured in the cartridge by choking the case into one of the cannellures. The bullet last approved has two cannellures; but in ammunition made prior to 14th March, 1874, a bullet with one cannellure only was used.

MODE OF PACKING AMMUNITION AND STORES OF A 0.45-INCH  
GATLING GUN, NAVAL SERVICE,

*Limber*

*Box,*

1 pair of drag ropes, lt., on footboard.  
1 set of men's harness, lt., on footboard.

1 can, lubricating, for oil. 6 drums with 1,440 cartridges.  
1 linch pin. 1 drag washer. 1 handle, crank shaft.  
2 locks, complete. 6 springs, lock, parts of (on lid).  
2 hammers } lock, 1 rod, { 1 clearer.  
4 firing pins } parts of. in parts, viz. { 1 cleaner.  
4 extractors } { 1 handle.  
Screws, lock { large, 16 } in tin box.  
                  { small, 16 }  
3 springs, cocking (on lid).  
2 burnishers. 2 screw-drivers.  
2 keys, iron, for taking lock apart, viz. :—1 body, 1 breech.  
2 spanners, adjusting screw, in front of main shaft.  
1 foresight. 1 tangent sight.

1 grease box, con-  
taining 3 lb. on  
near axle-tree.

1 padlock to lock  
box.

TRAIL

THE GUN.

GUN

# RANGE TABLE.

Elevation due to each 50 yards of range.

Distance of Object.	Elevation.	Distance of Object.	Elevation.
yards.	degs. mins.	yards.	degs. mins.
50	0 4	1,250	8 27
100	0 9	1,300	8 38
150	0 14	1,350	8 49
200	0 20	1,400	4 1
250	0 26	1,450	4 13
300	0 33	1,500	4 25
350	0 40	1,550	4 37
400	0 48	1,600	4 49
450	0 56	1,650	5 1
500	1 4	1,700	5 14
550	1 12	1,750	5 27
600	1 20	1,800	5 40
650	1 28	1,850	5 53
700	1 36	1,900	6 6
750	1 45	1,950	6 19
800	1 54	2,000	6 32
850	2 4	2,050	6 45
900	2 14	2,100	6 59
950	2 24	2,150	7 13
1,000	2 34	2,200	7 27
1,050	2 44	2,250	7 41
1,100	2 54	2,300	7 55
1,150	3 5	2,350	8 9
1,200	3 16	2,400	8 23

## NOMENCLATURE.

The following are the names of the principal parts of the gun :—

Barrels.

Block, pivot.

Bolts { cam,  
fixing, pivot block,  
pivot.

Boxes, tin, for screws, fixing locks.

Bracket, tangent sight complete, with fixing screws, set screw and steel spring.

Cam, complete, with steel seating and two screws.

Cartridge carrier.

Cascable plate.

Casing, breech.

Cocking arrangement, complete, with cover, fixing screws, pin-block, spring, spiral, and steel cam.

Collar, front of main shaft.

Cover, do. do.

- Crutch gear { carrier, complete with { cross pin, hand-wheel,  
distance piece,  
metal.  
fixing screw, for  
steel spring,  
handwheel,  
rocking boss,  
set screw,  
stop pin,  
screw bolt,  
steel spring.
- crutch.
- Discs { front, carrying gun barrels,  
rear, do. do.  
inside of casing.
- Drum, cartridge.
- Lock-extractor, complete, with loose ring, set screw for do.,  
spiral spring, jointed handle and pin, and curb chain with  
rings and stud.
- Gun-frame.
- Handle, crank.
- Hasp, fastening hopper, complete, with joint pin, push piece,  
split key, spiral spring, and catch.
- Hopper, feed drum, complete, with joint, joint pin, 2 fixing  
screws, guide pin, cartridge clearer, and 2 screws for  
ditto.
- Locks { complete, { butt,  
extractor,  
hammer,  
parts of { firing pin,  
plunger,  
screws, fixing { butt,  
extractor.  
spring.
- Lock-cylinder.
- Nuts { bolt, pivot,  
check, adjusting screw, main shaft,  
guide, rear.
- Pins { worm, revolving,  
disc, front,  
handle, crank,  
nut, guide, rear,  
carrier, cartridge,  
nut, hexagon, spindle,  
split { wheel, worm, revolving,  
bolt, pivot,
- Plate, bearing, main shaft.
- Rest, crank handle, complete, with spring and spring  
washer.

- Screws { adjusting, main shaft,  
breech casing,  $\frac{3}{8}$ -inch and  $\frac{1}{2}$ -inch,  
fixing, fore sight,  
crank handle rest,  
socket, disc inside casing.
- Shaft, main, complete with 3 feathers.
- Sights { fore,  
tangent.
- Slide, traversing arrangement, complete with pawl, joint pin  
for ditto, push-piece with spring for ditto, stud bolt, nut for  
ditto, and split pin for ditto.
- Socket, disc inside casing.
- Spindle, revolving, { collar,  
cones, worm, revolving,  
nut, fly,  
parts of { „ hexagon,  
„ worm, traversing,  
spindle,  
worm, revolving,  
„ traversing.
- Washer, bolt, pivot.
- Wheel, worm, revolving.

## INSTRUCTIONS IN THE USE OF THE GUN.

### 1. *Before the Gun is first used.*

Particular attention must be paid to the adjustment of the barrels with reference to the locks. The adjustment must be such that the hammer of the lock may strike with ample force to fire the cartridge, and at the same time there must be sufficient freedom to permit the barrels to revolve freely when the whole gun is heated by rapid firing.

### 2. *Working the Crank.*

As a rule the crank should not be worked forwards when the gun is unloaded; it may, however, be worked backwards.

### 3. *The Cartridge Drum*

Is provided with two registering strips on the under plate, which fit into two corresponding grooves on the hopper; these registering strips carry on their ends,—on the right, a clip which holds the drum in such a position that the cartridge cannot fall through the opening of the hopper; on the left, a thumb piece which acts as a guide when revolving the drum.

The cartridge drum should be filled with cartridges, as follows :—

Invert the drum, unlock it, turn the bottom plate until the hole comes directly over a compartment, raise the indicator with the left hand, and fill in the cartridges regularly, the bullets being placed next the centre of the drum, and the rims of the cartridges alternately on the right and left, and in advance and in rear of the previous cartridge,

letting the indicator down slowly until the compartment is full.  
Repeat the operation until all are filled.  
Take care to lock the drum before placing it upright again.

#### 4. *To use the Drum.*

Place the drum on the pin in the centre of the hopper, shift it until the registering strips have dropped into the grooves, press down the locking clip with the right hand, place the thumb of the left hand against the thumb piece, and the forefinger against one of the lugs on bottom edge of the drum, turn smartly until the two are in a line, the cartridges will then drop into the hopper, and the gun may be worked. The drum attendant must see that the indicator resting on the cartridges follows them closely in their descent, should it show any signs of sticking he must give it a touch to assist it; when the indicator is at the bottom some skill is required to bring the next row of cartridges over the hopper; care must be taken not to shift the drum either too soon or too late. In the former case there is a danger of changing the direction of the fall of the cartridges; in the latter case the cartridges may fall when the cartridge carrier is in a wrong position, and in either case a jam may be caused. The proper time to turn is when one shot has been fired after the indicator arrives at the bottom of the groove. When the drum is turned it should be done promptly, and with a decided motion.

#### 5. *To bring the Gun into Action.*

After unlimbering the gun, detach the crank from the rest, and turn the rest under the gun frame; raise the pawl out of the notch in the traversing plate, the gun will then be free; tighten up traversing worm by fly nut; slacken the set screw that holds the crutch, and raise the crutch with the left hand, whilst with the right hand gently move the gun by the cascable until the crutch is pressed into the thread of the traversing worm, the set screw must then be tightened against the crutch; the crank may now be turned a few times *backwards* to ascertain that the gun traverses freely.

#### 6. *To regulate the Amount of Traversing.*

The gun can be fired either in a fixed direction, or with a certain lateral spread. The traversing motion is communicated to the barrels by means of a traversing worm fitted with crutch. The worm is cut in four divisions corresponding to horizontal angles of  $4^{\circ} 45'$ ,  $3^{\circ} 20'$ ,  $1^{\circ} 50'$  and  $0^{\circ} 20'$  respectively.

If no traversing motion at all be required it is unnecessary to bring the crutch into action as described in paragraph 5. If traversing motion be required the officer in command must determine its amount, and slide the nut of traversing worm into its proper position to give the desired angle, which is done by pressing down the spring on the nut and turning the crank through 1, 2, or 3 revolutions, as the case may be, observing that the spring bolt snaps at the hole provided for it.

#### 7. *To obviate Stiffness in Working.*

Should the gun be found stiff in working, the stiffness may probably be due to one or more of the following causes:—

- a. Cartridges which may have some such defect as—large to gauge, rim too thick, or body of case bulged in loading.
- b. End of barrel burred up. This is caused by working the gun without cartridges; the lock snapping drives the end of the lock into the chamber and throws up a burr at entrance, this can be removed by a burnisher, or by a stick and emery.
- c. Insufficient freedom in shaft. Under the gun-metal cover at the front



of the gun is an adjusting screw and check nut ; this screw regulates the shaft so that the firing pin in the lock shall give sufficient penetration to fire the cap, at the same time allowing sufficient freedom for expansion of the shaft caused by the heating of the barrels. To regulate the screw, place a dummy cartridge in one of the barrels, turn the crank slowly until it fires, keep the handle in this position, tighten the screw until it presses against the shaft, then unscrew it one-sixth of a revolution, and tighten up the check nut. This will be found to be the right adjustment. While tightening the check nut, steady the screw head with a duplicate spanner.

- d. Steel seating on face of cam becoming indented. This steel seating, which receives the blow from the lock on firing, should stand a little above the gun-metal so that the lock will pass freely over after firing.
- e. Lubrication of locks. Should a cartridge burst at the base, a deposit will be left in the cartridge carrier or in the lock cylinder, and prevent the free working of the lock ; in this case the lock should be removed and the part cleaned.
- f. Worm wheel may require cleaning and oiling ; to do this remove the casable plate,

### 8. *Oiling generally.*

Oil holes are provided over the working parts ; Rangoon oil should be used.

### 9. *Jamming of Cartridges.*

Should jams occur in firing, this may generally be attributed to the defective management of the drum. Should this be the cause, a few slight motions of the crank backwards and forwards will jerk the cartridges into their proper positions, and so remove the obstruction. In no case should the crank be driven forwards with undue violence.

Jams will, however, sometimes arise from causes other than defective feedings, but almost all such cases are due to badly-constructed or damaged cartridges. The most common of these mishaps may arise from a miss-fire, when, if the gun be very foul, the bullet may remain in the barrel when the cartridge case is extracted, so that the succeeding cartridge cannot be placed in its proper position. In this case the bullet should be driven out of the barrel from the muzzle with the clearing rod.

Another cause of jams is due to a cartridge splitting in firing, and leaving, on extraction, a portion in the barrel. This is easily removed by the clearing rod—a steel rod split at the end.

Each gun is supplied with a rod for cleaning the barrels, and a split rod for removing bullets or portions of broken cartridge cases, &c., from the chambers.

In all cases where a jam, which cannot be rectified by working the crank as described, occurs, the crank should be locked in its rest, the hopper lifted, and the cause of jam ascertained. If it be immediately remediable, the obstruction should be removed and firing recommenced ; but if it be not desirable to cease firing, the lock belonging to the barrel where the jam has occurred should be removed, and firing may then go on with nine barrels.

### 10. *General Directions.*

Before new detachments are allowed to fire the Gatling gun rapidly, they should be carefully and thoroughly drilled to its use, and should be capable of rectifying any slight impediment to a steady and continuous fire.

No man should, on any account, get in front of the gun when in action, whether loaded or unloaded.

## INSTRUCTIONS FOR ARMOURERS FOR THE CARE AND REPAIR OF 0.45 INCH GATLING GUNS.

*(Extracted from the Instructions issued with Army Circulars, November, 1879.)*

### I. DIRECTIONS FOR TAKING THE GUN TO PIECES.

1. *To remove locks.*—Turn the gun until No. 8 on the rear disc is opposite an arrow head, which will be found on the hopper. Turn the lock extractor to the right, against the stop, withdraw with left hand, whilst the crank is moved slightly to and fro with the right; the lock No. 1 will now come from the gun with the extractor. Re-insert the extractor and bring No. 9 opposite arrow head, and repeat the operation until all the locks are out.

In 0.45 inch guns it will be necessary after the extractor has been withdrawn about 2 inches to turn it a little to the left, in order that the collar may clear the cascable button, a part of the collar being cut away for the purpose.

2. Take out lock extractor and unscrew cascable plate (a tap with mallet on the end of the wrench will assist).

3. Drive the taper pins out of the hexagon nut and revolving worm unscrew nuts, hexagon, and fly; remove traversing worm and cones, and withdraw crank and revolving spindle, drive split pin out of worm wheel, and remove with screw clamp.

4. See that the gun is supported by the frame only, not by the breech casing. Take out casing screws and remove cover and spring of cocking arrangement. Turn back the hopper.

5. Place the gun metal bridge across the frame of the gun, a little in front of the pivot block, pass the brass band under the barrels, and hook on to the iron bridge, push the assembling rest back as far as it will go, and by turning the nut take the weight of the barrels, &c.; the breech casing may now be drawn off.

6. Drive out the taper pin, remove the rear guide nut, by turning the nut to the right (left-handed thread) with gib key, whilst holding lock cylinder with another. The lock cylinder and cartridge carrier can now be drawn off the shaft.

7. *To remove barrels from frame (if necessary).*—Draw the shaft and barrels back a little, slack out the assembling rest, and rest the rear disc on the back edge of the pivot block. Place two pieces of copper rod in the top barrels (the copper must be as near the size of the bore as possible) to stand out about 6 inches. The rear end of main shaft will be held by one man, whilst another, having hold of the copper rods, moves the barrels a few inches back; they will now be clear of the frame.

8. *To remove the main shaft from barrels.*—Support the barrels in wooden V blocks, just behind the fore disc, and in front of rear disc; drive the shaft out from rear end, with a baulk of timber,

having a man to steady fore end of shaft and front disc as it leaves the barrels.

9. *To strip a lock.*—Take out fixing screws, remove extractor and unscrew butt; draw spiral spring through end, and hammer and firing pin through slot in plunger.

## II. DIRECTIONS FOR PUTTING THE GUN TOGETHER.

10. Screw barrels into rear disc, until extractor slots in each coincide. Fix front disc on main shaft, pass shaft through rear disc and fore disc over barrels: drive into position with baulk of timber.

11. Slide the cartridge carrier (with steady pin) on shaft, then the lock cylinder, lastly screw on rear guide nut until a line at the bottom of one of the grooves corresponds with a similar line on the lock cylinder; drive taper pin in rear guide nut.

12. Place bearing plate and collar in bearing at the fore-end of frame, insert fore-end of shaft, allowing the rear disc to rest upon the back edge of pivot block, whilst the assembling rest is adjusted to take the weight.

13. Place the cocking arrangement in breech casing. Slide on the breech casing, raising or lowering the shaft (by means of assembling rest) to suit the hole in the disc inside casing, put on cover and spring for cocking arrangement, and screw in casing screws; drive on worm wheel and fix split pin.

14. Pass the crank shaft through the hole in casing, put on the collar, then holding the revolving worm in position, push the shaft through to its place; drive in pin of revolving worm, and screw nut on end.

15. Put traversing gear on crank shaft in the following order: Cone with large hole, traversing worm, cone with small hole, fly nut, and hexagon nut, drive in taper pin.

16. Screw on cascable plate until a notch upon it corresponds with a similar one on the top of breech casing. Turn gun until No. 8 on rear disc coincides with arrow head.

17. Insert No. 1 lock, push it up to its place with lock extractor: turn gun until No. 9 and arrow head coincide, withdraw lock extractor; insert No. 2 lock and continue in the same order.

Leave lock extractor in gun.

## III. ADJUSTMENT OF GUN.

18. To ensure the free working of the gun, and at the same time to guard against miss-fires, a certain amount of lateral freedom must be given to the main shaft.

19. Insert a dummy cartridge, or an empty cartridge case in the chamber of one of the barrels; turn the gun round until this barrel is in firing position, set the barrels up to this by screwing in the adjusting screw, care being taken not to force them up,

merely feel the pressure; now unscrew one-sixth of a turn, or revolution, and lock in position by the check nut. In choosing a cartridge case, see that the head is in good condition, and that the body fits loosely in the chamber, otherwise some difficulty will be experienced in feeling when it is home in the cartridge head recess. The adjusting screw will be found by taking off the gun-metal cover on front of frame.

#### IV. MISS-FIRES.

20. In practice should miss-fires occur, the gun should be at once tested to see that there is not too much lateral play in the main shaft.

#### V. INSTRUCTIONS FOR REPLACING A BARREL IN GATLING GUNS.

21. Screw out the old barrel, retaining it as a pattern for slotting the new one. The earlier Nos. of 0.45-inch require to be stripped to get out the barrel.

22. Screw in the new barrel hard up against the shoulder for position. Mark off position of the extractor slot on the barrel, and with care file out slot at this mark. Copy the round shape of the first angular face of the groove, the other can be filed flat.

23. The undermentioned tools are required for this operation; the numbers specified being sufficient to fit four barrels.

##### (a.) FOR 0.45-INCH GUN.

Files, 6-inch, pillar, rough ( $\frac{1}{4}$ -inch wide) ....	....	....	3
„ 4-inch, square, smooth ....	....	....	2
„ 4-inch, 3 square, bastard (blunt point) ....	....	....	2
„ 3-inch, 3 square, smooth ....	....	....	1

##### SPARE PARTS—No. 1 Chest.

Barrel ....	....	....	....	....	....	....	....	....	1
Handle, crank ....	....	....	....	....	....	....	....	....	1†
Locks {	parts {	of {	complete....	....	....	....	....	....	74
			extractors	....	....	....	....	....	78
			hammers	....	....	....	....	....	72
			pins, firing	....	....	....	....	....	78
			screws } butt	....	....	....	....	....	16†
			fixing } extractor	....	....	....	....	....	16†
Pins {	handle, crank	nut, hexagon, spindle	screws } butt	....	....	....	....	....	16†
			fixing } extractor	....	....	....	....	....	16†
			screws } butt	....	....	....	....	....	16†
Screws, breech casing, $\frac{3}{8}$ -inch	„	„	spring } extractor	....	....	....	....	....	712
			screws } butt	....	....	....	....	....	712
Sights {	fore	tangent	spring....	....	....	....	....	....	1
			spring....	....	....	....	....	....	1
Screws, breech casing, $\frac{3}{8}$ -inch	„	„	spring....	....	....	....	....	....	1
			spring....	....	....	....	....	....	1
Sights {	fore	tangent	spring....	....	....	....	....	....	1
			spring....	....	....	....	....	....	1

† In tin box.

Spindle, revolving, parts of.	collar	....	....	....	....	....	....	1†
	cones, worm, traversing	....	....	....	....	....	....	2†
	nut, fly	....	....	....	....	....	....	1†
	nut, hexagon	....	....	....	....	....	....	1†
	nut, worm traversing	....	....	....	....	....	....	1†
	spindle	....	....	....	....	....	....	1†
	worm, revolving....	....	....	....	....	....	....	1†
	worm, traversing	....	....	....	....	....	....	1†
Springs, spiral, cocking								¶6
Wheel, worm, revolving								1†

Spare drums, two for each gun fitted for sea service, are carried separately.

NOTE.—When the gun is required for service on shore, the spare parts with the exception of those marked †, and half the proportions of those marked ¶, are stored in the limber boxes, in which there are leather fittings for the purpose; the remainder are kept on board.

### SPECIAL TOOLS—No. 2 Chest.

Bridge,	{	band, brass	....	....	....	....	....	....	*1
assembling		{	bridges {gun-metal	....	....	....	....	....	*1
rest, parts			iron	....	....	....	....	....	*1
of	{	nuts, brass	....	....	....	....	....	....	*1
Burnishers, steel, chamber of barrel				....	....	....	....	....	2
Cramp, drawing	{	cramp	....	....	....	....	....	....	*1
off worm wheel,		{ screw, steel....	....	....	....	....	....	....	*1
Drivers, screw, {	{	6½-inches	....	....	....	....	....	....	1
for lock		{ 7 "	....	....	....	....	....	....	*1
Keys	{	box, {	pin, nut, worm revolving	....	....	....	....	....	*1
			removing screws in casing	....	....	....	....	....	*1
			for lock {	body	....	....	....	....	1
	breech	....		....	....	....	1		
	{	unscrewing barrels	....	....	....	....	....	....	*1
			gib, {	lock cylinder	....	....	....	....	....
		rear nut	....	....	....	....	....	*1	
Pin, key, box, removing screws, breech casing			....	....	....	....	....	*1	
Punch, pin, rear nut			....	....	....	....	....	....	*1
Rod in {	{	cleaning, iron	....	....	....	....	....	....	†1
parts,		clearing, steel	....	....	....	....	....	....	†1
		handle, iron	....	....	....	....	....	....	†1
Spanners, adjusting screw in front of main shaft			....	....	....	....	....	....	2
Wrench, key, box unscrewing barrels....			....	....	....	....	....	....	*1

NOTE.—When the gun is required for service on shore, the special tools, with the exception of those marked \* and †, are stowed in the limber box, in which there are leather fittings for the purpose; the remainder are kept on board.

† Rod in parts though a special tool is carried in No. 1 chest, as the chest No. 2 is not long enough; when for service on shore it is carried in limber box.

The following are supplied with each limber :—

Drums	....	....	....	8	6 in limber and 2 spare.
Grease box....	....	....	....	1	on rear of axletree.
Spare pole with two slats....	....	....	....	1	to each ship; kept on board.
Oil can	....	....	....	1	} stowed in limber.
Spare lynch pin	....	....	....	1	
Spare drag washer	....	....	....	1	} stowed on footboard.
Set of men's harness, light	....	....	....	1	
Pair of drag ropes, light....	....	....	....	1	

The lid of limber box is secured by a padlock.

Two small arm ammunition boxes, containing spare ammunition, can be carried under the limber box, in front.



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